Aug. 29, 1944. E. GFELLER 2,357,186

METHOD AND APPARATUS FOR COOLING AND DRYING ACETYLENE

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Fig. 1

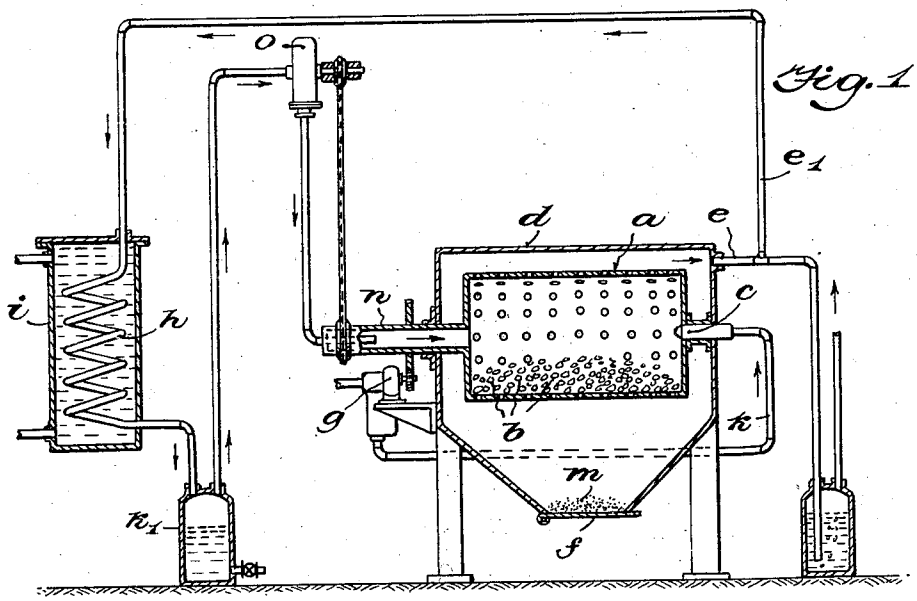
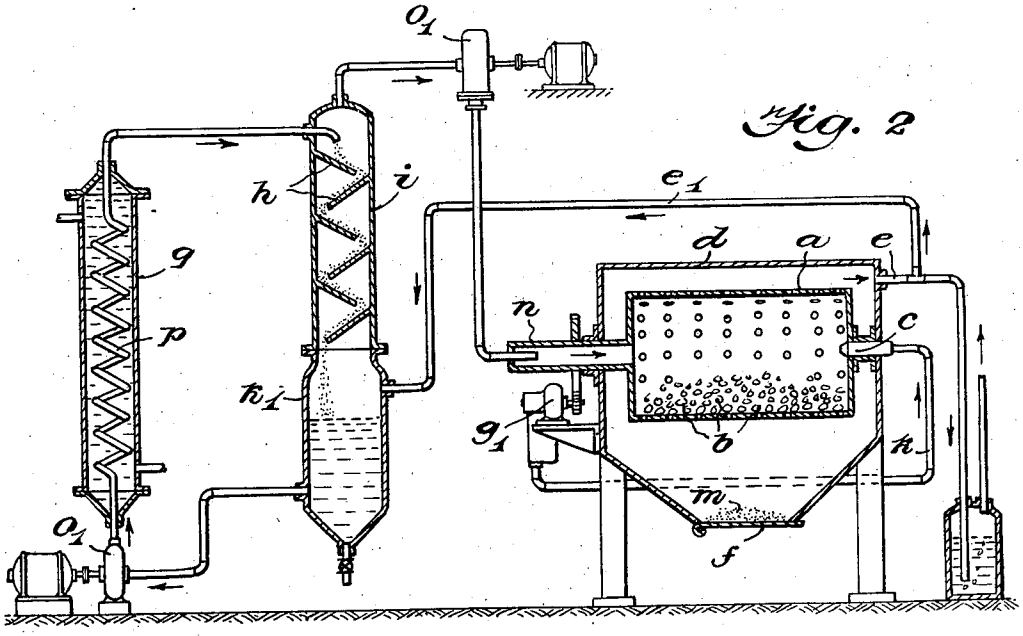


Fig. 2



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METHOD AND APPARATUS FOR COOLING AND DRYING ACETYLENE

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7 Claims. (Cl. 48—4)

The present invention relates to a method for reducing the temperature in the drum of an apparatus for the gasification of calcium carbide. According to the invention, a part of the quantity of the acetylene gas leaving the apparatus is cooled by means of a cooling device and is thereafter caused to return back to the carbide drum.

The accompanying drawing illustrates schematically in Figs. 1 and 2 two examples of embodiment of the apparatus for the execution of the above said method, this apparatus forming also an object of the invention.

In Fig. 1, *a* is a horizontal carbide drum, *b* are lumps of carbide rolling about in the rotating drum, *c* is a water-spraying nozzle arranged in the drum axle, *d* is a casing surrounding the drum, *e* is the outlet pipe, *f* is an opening provided with a cover for removing the residues *m* of the carbide. *n* is a hollow shaft arranged in the opposite axle of the drum, through which cooled acetylene gas is conducted back into the carbide drum *a*, *h* is a cooling coil, which is arranged in a vessel *i* containing a cooling liquid, k_1 is a vessel for the reception of condensed water from the cooling coil *h*, *o* is a gas conveying blower, *g* is a water motor rotating the shaft *n*, which also drives the blower *o*.

The operation of the above described apparatus is as follows:

By means of the blower *o* a part of the quantity of acetylene gas leaving the drum *a* through the outlet pipe *e* is first sucked through the pipe e_1, then through the cooling coil *h*, in which the gas is cooled, and finally through the vessel k_1, in which is retained the condensed water, whereafter the gas is conveyed back to the carbide drum *a* through the hollow shaft *n*.

When the carbide is gasified, reaction heat is developed which heats the acetylene gas. Owing to this, secondary reactions take place causing losses of acetylene gas. The advantage of the cooling device resides in the fact, that the acetylene gas produced in the carbide drum is mixed with cooled gas which is returned to the carbide drum, whereby the temperature in the latter is considerably reduced. Owing to this reduction of temperature, secondary reactions in the drum are avoided.

The control of the gas blower is advantageously effected as schematically illustrated i. e. from the rotating shaft of the drum, the cooling being thus so controlled that it only takes place when the carbide drum rotates.

In the embodiment according to Fig. 1, the cooling of the acetylene gas returning to the drum is effected indirectly by means of a water-cooler. The cooling can also be attained in a different manner. In the apparatus shown in Fig. 2, the acetylene gas is cooled by washing the latter with cooled water. The water system forms a closed circuit, in which the water is conveyed by means of a pump. In this circuit is arranged a water-cooler, by means of which the water is always cooled. The apparatus according to Fig. 2 comprises besides this cooling system and the parts mentioned with regard to Fig. 1 a column *i* in which are arranged plates *h*. The column *i* is screwed on a water collecting vessel k_1. From this vessel the water is conveyed by means of a pump o_1 through a cooler *q* respectively through its coil *p* and is conducted into the top part of the washing column *i*. The acetylene gas sucked by the gas blower *o* is conducted through the pipe e_1 into the water vessel k_1, wherefrom it is caused to flow through the column *i* in the opposite direction to the wash water current and is then conveyed in its cooled condition by the blower *o* which causes it to return through the hollow shaft *n* into the carbide drum *a* which is rotated by means of an electric driving motor g_1.

The control of the pump o_1 as well as of the gas blower *o* is effected by means of electric motors, which are in such relationship (not shown) with the driving water motor g_1, that when the latter is at a standstill, the two other motors will also be at rest, so that interruption of the circuit of the water as well as of the circuit of the gas flowing through the column will take place simultaneously.

What I claim is:

1. In the dry production of acetylene from calcium carbide by reaction with a minor excess of water, the method of controlling the temperature and humidity of the reaction which consists in drawing off a portion of the hot humid acetylene gas from the reaction chamber, cooling this portion to condense water vapor, separating the condensate from this gas portion and returning the gas portion to the reaction zone.

2. In the dry production of acetylene from calcium carbide by reaction with a minor excess of water, the method of cooling and drying the hot humid acetylene thus produced which consists in drawing off a portion of the hot humid acetylene gas from the reaction chamber, washing this portion with cold water and returning the gas portion to the reaction zone.

3. In the dry production of acetylene from cal-

cium carbide by reaction with a minor excess of water, the method of cooling and drying the hot humid acetylene thus produced which consists in drawing off a portion of the hot humid acetylene gas from the reaction chamber simultaneously with and proportionately to the rate at which the reaction is carried out, cooling this portion to condense water vapor, separating the condensate from this gas portion and returning the gas portion to the reaction zone.

4. In an apparatus for generating acetylene gas comprising a reaction chamber for calcium carbide, means for feeding water to the carbide and a discharge for the acetylene gas generated; means for controlling the temperature and humidity of the gas comprising a pipe for withdrawing a portion of the gas from the discharge, a cooler connected to the pipe, a return pipe from the cooler to the reaction chamber and a pump between the cooler and the return pipe.

5. In an apparatus for generating acetylene gas comprising a reaction chamber for calcium carbide, means for feeding water to the carbide and a discharge for the acetylene gas generated; means for cooling and drying the gas comprising a pipe for withdrawing a portion of the gas from the discharge, a cooler connected to the pipe, a liquid trap connected to the cooler, a return pipe from the trap to the reaction chamber and means for pumping the gas through the return pipe.

6. In an apparatus for generating acetylene gas comprising a reaction chamber for calcium carbide, means for feeding water to the carbide and a discharge for the acetylene gas generated; means for cooling and drying the gas comprising a pipe for withdrawing a portion of the gas from the discharge, a washing tower connected to the pipe, a return pipe from the tower to the reaction chamber and means for pumping the gas through the return pipe.

7. In an apparatus for generating acetylene gas comprising a reaction chamber for calcium carbide, means for feeding water to the carbide and a discharge for the acetylene gas generated; means for cooling and drying the gas comprising a pipe for withdrawing a portion of the gas from the discharge, a washing tower connected to the pipe, a return pipe from the tower to the reaction chamber, means for pumping the gas through the return pipe, a cooler, a pump and piping for pumping the condensate from the tower through the cooler and back to the tower.

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